

**REMARKS**

The Applicants would like to thank the Examiner for allowing Claims 3, 4, 7, 8, 11, 12, 15, 16, 19, 20, 31, 32, 35, 36, 44 and 49. The Applicants have amended independent Claims 1, 9, 17, 29, 42 and 47, with allowable subject matter from the allowed Claims 3, 11, 19, 31, 44 and 49, respectively, and therefore, these independent claims and their dependent claims are now all allowable. The Applicants have also added new Claims 52-57. Support for the new Claims 52-57 appears in the specification, as well as in the amended Claims 17, 20, 42, 43, 45 and 46, respectively. The Applicants have canceled Claims 2, 3, 10, 11, 18, 19, 21-28, 30, 31, 40, 41, 44 and 49 without prejudice to Applicants' right to file a Divisional or Continuation or Continuation-in-Part Patent Application for said canceled claims.

**CONCLUSION:**

It is therefore respectfully submitted that Claims 1, 4-9, 12-17, 20, 29, 32-39, 42, 43, 45-48, 50-57 are now all allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

The Examiner is also invited to contact the undersigned attorney if any communication is believed to be helpful in advancing the examination of the present application.

Respectfully submitted,

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS**

Please cancel Claims 2, 3, 10, 11, 18, 19, 21-28, 30, 31, 40, 41, 44 and 49

Please amend the claims as follows:

1. (Amended) A network, including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, comprising:
  - a repair server in the network monitoring received ones of the packets to said recipients, the repair server including a missing packet detector; [and]
  - a plurality of retransmit servers in the network buffering portions of the packets during the session;
  - said repair server detecting missing packets and in response thereto, sequentially requesting missing packets from respective ones of the plurality of retransmit servers;
  - said repair server including an ordered list of the retransmit servers that are most likely to have buffered copies of packets missing from the session;
  - said repair server detecting that there are packets missing from the session it has received, and using the ordered list to sequentially request the missing packets from respective ones of the plurality of retransmit servers; and
  - said ordered list ranking the respective retransmit servers based on the performance of the retransmit servers in past repair sessions.
4. (Amended) The network of claim 1 [2], which further comprises:
  - said ordered list ranking the respective retransmit servers based on receiver reports multicast by each of the retransmit servers.

5. (Amended) The network of claim 1 [2], which further comprises:  
said ordered list ranking the respective retransmit servers based on the fraction of data packets from the source lost by a retransmit server.
6. (Amended) The network of claim 1 [2], which further comprises:  
said ordered list ranking the respective retransmit servers based on the cumulative number of packets from the source that have been lost by a retransmit server.
7. (Amended) The network of claim 1 [2], which further comprises:  
said ordered list ranking the respective retransmit servers based on an estimate of the statistical variance of the packet interarrival time experienced by a retransmit server.
8. (Amended) The network of claim 1 [2], which further comprises:  
said ordered list ranking the respective retransmit servers based on the round trip propagation delay between the source and a retransmit server which may be used as an approximate measure of distance between the source and the retransmit server.
9. (Amended) In a network including a long-haul portion with multicast enabled routers and non-multicast enabled routers, the network further including a source of multicast packets in a multicast session coupled to a first node of the long-haul portion, and the network further including a plurality of multicast recipients in that session coupled to a second node of the long-haul portion, a multicast session repair system, comprising:  
a repair server in the network monitoring received ones of the packets in the multicast session to said recipients, the repair server including a missing packet detector,  
a plurality of retransmit servers in the network buffering portions of the packets during the multicast session;  
said repair server detecting missing packets and in response thereto, sequentially requesting missing packets from respective ones of the plurality of retransmit servers;

[and]

a unicast message processor in at least one of the retransmit servers, retransmitting in a unicast session to the repair server at least a portion of the missing packets in response to one of said requests;

said retransmitted packets in said unicast session being forwarded by at least some of the non-multicast enabled routers in the long-haul portion, to thereby circumvent at least some of the multicast enabled routers in the long-haul portion;

said repair server including an ordered list of the retransmit servers that are most likely to have buffered copies of packets missing from the session;

said repair server detecting that there are packets missing from the session it has received, and using the ordered list to sequentially request the missing packets from respective ones of the plurality of retransmit servers; and

said ordered list ranking the respective retransmit servers based on the performance of the retransmit servers in past repair sessions.

12. (Amended) The network of claim 9 [10], which further comprises:

said ordered list ranking the respective retransmit servers based on receiver reports multicast by each of the retransmit servers.

13. (Amended) The network of claim 9 [10], which further comprises:

said ordered list ranking the respective retransmit servers based on the fraction of data packets from the source lost by a retransmit server.

14. (Amended) The network of claim 9 [10], which further comprises:

said ordered list ranking the respective retransmit servers based on the cumulative number of packets from the source that have been lost by a retransmit server.

15. (Amended) The network of claim 2 [10], which further comprises:  
said ordered list ranking the respective retransmit servers based on an estimate of the statistical variance of the packet interarrival time experienced by a retransmit server
16. (Amended) The network of claim 2 [10], which further comprises:  
said ordered list ranking the respective retransmit servers based on the round trip propagation delay between the source and a retransmit server which may be used as an approximate measure of distance between the source and the retransmit server.
17. (Amended) A method for repairing multicast packets in a network including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, comprising:  
monitoring received ones of the packets to said recipients with a repair server in the network;  
buffering portions of the packets during the session at a plurality of retransmit servers in the network;  
detecting missing packets in said repair server and in response thereto, sequentially requesting missing packets from respective ones of the plurality of retransmit servers;  
forming an ordered list at said repair server, said list storing identities of the retransmit servers that are most likely to have buffered copies of packets missing from the session;  
detecting that there are packets missing from the session it has received at the repair server;  
using the ordered list to sequentially request the missing packets from respective ones of the plurality of retransmit servers; and  
said ordered list ranking the respective retransmit servers based on the performance of the retransmit servers in past repair sessions.

20. (Amended) [The] The method of claim 17 [18], which further comprises:  
said ordered list ranking the respective retransmit servers based on receiver reports multicast by each of the retransmit servers.

29. (Amended) In a network including a long-haul portion with multicast enabled routers and a bypass portion, the network further including a source of multicast packets in a multicast session coupled to a first node of the long-haul portion, and the network further including a plurality of multicast recipients in that session coupled to a second node of the long-haul portion, a multicast session repair system, comprising:

a repair server in the network monitoring received ones of the packets in the multicast session to said recipients, the repair server including a missing packet detector;  
a plurality of retransmit servers in the network buffering portions of the packets during the multicast session;

said repair server detecting missing packets and in response thereto, sequentially requesting missing packets from respective ones of the plurality of retransmit servers;  
[and]

a bypass message processor in at least one of the retransmit servers, retransmitting in a bypass session over said bypass portion to the repair server at least a portion of the missing packets in response to one of said requests;

said retransmitted packets in said bypass session being forwarded over said bypass portion, to thereby circumvent at least some of the multicast enabled routers in the long-haul portion;

said repair server including an ordered list of the retransmit servers that are most likely to have buffered copies of packets missing from the session;

said repair server detecting that there are packets missing from the session it has received, and using the ordered list to sequentially request the missing packets from respective ones of the plurality of retransmit servers; and

said ordered list ranking the respective retransmit servers based on the performance of the retransmit servers in past repair sessions.

32. (Amended) The network of claim 29 [30], which further comprises:  
said ordered list ranking the respective retransmit servers based on receiver reports multicast by each of the retransmit servers.
33. (Amended) The network of claim 29 [30], which further comprises:  
said ordered list ranking the respective retransmit servers based on the fraction of data packets from the source lost by a retransmit server.
34. (Amended) The network of claim 29 [30], which further comprises:  
[aid] said ordered list ranking the respective retransmit servers based on the cumulative number of packets from the source that have been lost by a retransmit server
35. (Amended) The network of claim 29 [30], which further comprises:  
said ordered list ranking the respective retransmit servers based on an estimate of the statistical variance of the packet interarrival time experienced by a retransmit server.
36. (Amended) The network of claim 29 [30], which further comprises:  
said ordered list ranking the respective retransmit servers based on the round trip propagation delay between the source and a retransmit server which may be used as an approximate measure of distance between the source and the retransmit server.
42. (Amended) A method for repairing multicast packets in a network including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, comprising:  
monitoring received ones of the packets to said recipients with a repair server in the network;  
buffering portions of the packets during the session at a retransmit server in the network;  
detecting missing packets at said repair server and in response thereto, requesting

missing packets from retransmit server;

said retransmit server transmitting an enhanced reliability stream of packets; and

said enhanced reliability stream of packets being supplemented by block interleaving of packets.

47. (Amended) A system for repairing multicast packets in a network including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, comprising:

a repair server monitoring received ones of the packets to said recipients in the network;

a retransmit server buffering portions of the packets during the session in the network;

said repair server detecting missing packets and in response thereto, requesting missing packets from retransmit server;

said retransmit server transmitting an enhanced reliability stream of packets; and

said enhanced reliability stream of packets being supplemented by block interleaving of packets.

Please add new Claims 52-57 as follows:

-- 52. (New) A program storage device readable by a machine, tangibly embodying a program of executable instructions to perform a method for repairing multicast packets in a network including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, the method comprising:

monitoring received ones of the packets to said recipients with a repair server in the network;

buffering portions of the packets during the session at a plurality of retransmit servers in the network;

detecting missing packets in said repair server and in response thereto,



sequentially requesting missing packets from respective ones of the plurality of retransmit servers;

forming an ordered list at said repair server, said list storing identities of the retransmit servers that are most likely to have buffered copies of packets missing from the session;

detecting that there are packets missing from the session it has received at the repair server,

using the ordered list to sequentially request the missing packets from respective ones of the plurality of retransmit servers; and

said ordered list ranking the respective retransmit servers based on the performance of the retransmit servers in past repair sessions.

53. (New) The program storage device of claim 52, which further comprises said ordered list ranking the respective retransmit servers based on receiver reports multicast by each of the retransmit servers.

54. (New) A program storage device readable by a machine, tangibly embodying a program of executable instructions to perform a method for repairing multicast packets in a network including a source of multicast packets in a multicast session and a plurality of multicast recipients in that session, the method comprising:

monitoring received ones of the packets to said recipients with a repair server in the network;

buffering portions of the packets during the session at a retransmit server in the network;

detecting missing packets at said repair server and in response thereto, requesting missing packets from retransmit server;

said retransmit server transmitting an enhanced reliability stream of packets; and

said enhanced reliability stream of packets being supplemented by block interleaving of packets.

55. (New) The program storage device of claim 54, which further comprises:  
said enhanced reliability stream of packets being supplemented by redundant  
packets.
56. (New) The program storage device of claim 54, which further comprises:  
said enhanced reliability stream of packets being supplemented by forward error  
correction coding.
57. (New) The program storage device of claim 54, which further comprises:  
forming at said repair server an ordered list of a plurality of said retransmit  
servers, said list storing identities of the retransmit servers that are most likely to have  
buffered copies of packets missing from the session;  
detecting that there are packets missing from the session it has received at the  
repair server, and  
using the ordered list to sequentially request the missing packets from respective  
ones of the plurality of retransmit servers.--